vacuubrand

Technology for Vacuum Systems

Instructions for use

ME 4 NT - MZ 2 NT - MZ 2D NT - MZ 2S NT
ME 8 NT - ME 8S NT - MD 4 NT - MV 2 NT
ME 4R NT

Diaphragm pumps

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Dear customer,

Your VACUUBRAND diaphragm pumps should support you for many years without trouble and with optimal performance. Thanks to our long practical experience we have much information and advice how you can achieve powerful application and personal safety through our products. Please read these instructions for use before the initial operation of your pump.
VACUUBRAND diaphragm pumps are the result of many years of experience in design and construction and practical operation of these pumps combined with the latest developments in material and manufacturing technology.

Our quality maxim is the ”zero fault principle”:
Every diaphragm pump, leaving our company, is tested intensively including an endurance run of 18 hours. Therefore faults, even those which occur rarely, are identified and can be eliminated immediately.
The achievement of the specifications after the endurance run is tested for every pump.
Every VACUUBRAND pump achieves the specifications. We are committed to providing our customers with this high quality standard.
We know that the vacuum pump can not replace all of your real work and hope that our products contribute to an effective and trouble-free realisation of your work.

Yours
VACUUBRAND GMBH + CO KG

After sales service: Contact your local dealer or call +49 9342 808-193.

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DANGER ➨ Danger! Immediate danger. Death or severe injuries as well as damage to equipment and environment can occur.

WARNING ☞ Warning! Possible danger. Severe injuries as well as damage to equipment and environment can occur.

CAUTION • Caution! Possible danger. Slight injuries as well as damage to equipment and environment can occur.

NOTICE Note. Disregarding of notes may cause damage to the product.

Caution! Hot surface!

Isolate equipment from mains before removing the cover.

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Safety information!

General information

NOTICE

☞ **Read and comply with this manual before installing or operating the equipment.**
☞ Transport the pump at the provided handle.
Remove all packing material, remove the product from its packing-box, remove the protective covers from the inlet and outlet ports and keep, inspect the equipment.
If the equipment is damaged, notify the supplier and the carrier in writing within three days; state the item number of the product together with the order number and the supplier's invoice number. Retain all packing material for inspection.
Do not use the equipment if it is damaged.
If the equipment is not used immediately, replace the protective covers. Store the equipment in suitable conditions.

Intended use

⚠WARNING

☞ The pump and all system parts are not to be used on humans or animals.
☞ Prevent any part of the human body from coming in contact with the vacuum.
☞ Make sure that the individual components are only connected, combined and operated according to their design and as indicated in the instructions for use.
☞ Comply with notes on correct vacuum and electrical connections, see section "Use and operation".

⚠CAUTION

- The pumps are designed for **ambient temperatures** during operation between +10°C and +40°C. Check the maximum temperatures if installing the pump in a cabinet or a housing and make sure ventilation is adequate. Install an external automatic ventilation system if necessary. If pumping hot process gases make sure that the maximum permitted gas inlet temperature, which depends on several parameters like inlet pressure or ambient temperature (see "Technical data"), is not exceeded.
- Particles and dust must not be aspirated.

NOTICE

Use the equipment **for the intended use only**, i.e. for generation of vacuum in vessels designed for that purpose.

Setting up and installing the equipment

⚠ DANGER

➨ Equipment must be connected only to a **suitable fused and protected electrical supply** and a suitable earth point. Failure to connect the motor to ground may result in deadly electrical shock.
The supply cable may be fitted with a moulded European IEC plug or a plug suitable for your local electrical supply. If the plug has been removed or has to be removed, the cable will contain wires colour coded as follows: green or green and yellow: earth; blue or white: neutral; brown or black: live.

⚠WARNING

☞ Do not permit any **uncontrolled pressurizing** (e.g. make sure that the exhaust pipeline cannot become blocked). If you have an exhaust isolation valve, make sure that you cannot operate the equipment with the valve closed. **Risk of bursting!**
☞ Provide always a free and pressureless exhaust pipeline.

⚠CAUTION

- Comply with **maximum permissible pressures** at inlet and outlet and pressure differences, see section "Technical data". Do not operate the pump with overpressure at the inlet.

- Check that mains voltage and current conform with the equipment (see rating plate).
- Change the setting of the voltage changeover switch (pump with dual-voltage motor) only if the pump is separated from mains. Check that the voltage changeover switch is set correctly. **Attention**: If the pump is switched on with wrong voltage selection, the motor might be damaged!

- Due to the high compression ratio of the pumps, pressure at the outlet port might be generated being higher than the maximum permissible pressure compatible with the mechanical stability of the system.

- Avoid overpressure of more than 0.2 bar in case inert gas is connected.
- Connect pipes gas tight at inlet and outlet of the pump.
- **Attention:** Flexible elements tend to shrink when evacuated.

NOTICE

Provide a firm level platform for the equipment and check that the system to be evacuated is mechanically stable and that all fittings are secure. Ensure a stable position of the pump without any mechanical contact except of the pump feet. Comply with all applicable safety regulations.

Keep a distance of minimum 20 cm between fan and ambient parts (e.g. housing, walls, ...). Check fan regularly for dust/dirt, clean if necessary to avoid a cutback of ventilation.

If the equipment is brought from cold environment into a room for operation, allow the equipment to warm up (pay attention to water condensation on cold surfaces).

The diameter of the inlet and outlet pipeline should be at the least as large as the diameter of the pump connection pipelines.

Comply with all **applicable and relevant safety requirements** (regulations and guidelines), **implement the required actions and adopt suitable safety measures**.

Ambient conditions

NOTICE

To the best of our knowledge the equipment is in compliance with the requirements of the applicable EC-directives and harmonized standards (see ”Declaration of conformity”) with regard to design, type and model. Directive IEC 1010 gives in detail conditions, under which the equipment can be operated safely (see also IP degree of protection).
Adopt suitable measures in case of differences, e. g. using the equipment outdoors, installation in altitudes of more than 1000 m above mean sea level, conductive pollution or bedewing.
Pay attention to the **permissible maximum ambient and gas inlet temperatures** (see ”Technical data”).

Operating conditions

⚠ DANGER

➨ **The pumps have no approval for operation in or for pumping of potentially explosive atmospheres.**

➨ The pumps are **not suitable** to pump
- **unstable substances** and substances which react explosively under **impact** (mechanical stress) and/or when being exposed to **elevated temperatures** without air.

- **self inflammable** substances,
- substances which are inflammable without air and
- **explosive substances**.

CAUTION

- The pumps are **not suitable** for pumping substances which may form **deposits** inside the pump. Deposits and condensate in the pump may lead to increased temperatures even to the point of excessing the maximum permitted temperatures!

- If there is a danger of **deposits** in the pump chamber (check inlet and outlet of the pump), inspect the pump chambers regularly and clean if necessary.

- The pumps are **not suitable** for pumping dust and have **no approval** for operation below ground.

NOTICE

If pumping **different substances**, it is recommended to purge the pump with air or inert gas prior to changing the pumped media in order to pump out residues and to avoid reactions of the pumped substances with each other and with the pump materials.
Take into consideration interactions and chemical reactions of the pumped media. Ensure that the materials of the wetted parts are compatible with the pumped substances, see section ”Technical data”.

Safety during operation

DANGER

➨ Adopt suitable measures to prevent the release of dangerous, toxic, explosive, corrosive, noxious or polluting fluids, vapours and gases. In case install an appropriate collecting and disposal system and take protective action for pump and environment.

➨ Prevent any part of the human body from coming in contact with vacuum.

➨ The user must take suitable precautions to prevent any formation of explosive mixtures in the expansion chamber or at the outlet. In case of e.g. a diaphragm crack, mechanically generated sparks, hot surfaces or static electricity may ignite these mixtures. Use inert gas for venting if necessary.
➨ Potentially explosive mixtures at the outlet of the pump have to be drained appropriately, sucked off or diluted with inert gas to non-explosive mixtures.

WARNING

☞ Pay attention to the symbol ”hot surfaces” on the equipment. Adopt suitable measures to prevent any danger arising from the formation of hot surfaces or electric sparks. Provide a suitable protection against contact if necessary.

☞ Ensure that the exhaust pipeline is always free and pressureless.

CAUTION

- Comply with applicable regulations when disposing of chemicals. Take into consideration that chemicals may be polluted.
  Take adequate precautions to protect people from the effects of dangerous substances (chemicals, thermal decomposition products of fluoroelastomers), wear appropriate safety-clothing and safety glasses.

- Use only **OEM spare parts and accessories.** Otherwise safety and performance of the equipment as well as the electromagnetic compatibility of the equipment might be reduced. Possibly the CE mark or the cTÜVus mark become void if not using OEM spare parts.

NOTICE

Do not start the pump if the pressure difference between inlet and outlet port exceeds 1.1 bar at maximum.

Prevent the backpressure of gases and the backflow of condensates.
Never suck liquids or dust into the pump.

Provide appropriate protective measures (i.e precautions which allow for the requirements of the respective application) even for the case of failure and **malfunction**.

Failure of the pump (e.g. due to power failure) or of connected components, parts of the supply or change of parameters must not lead to a critical dangerous situation under any circumstances. In case of diaphragm cracks or leaks in the manifold pumped substances might be released into the environment or into the pump housing or motor. Comply especially with notes on operation and use and maintenance.

Due to the residual **leak rate of the equipment**, there might be an exchange of gas, albeit extremely slight, between the environment and the vacuum system.
Adopt suitable measures to prevent contamination of the pumped substances or the environment.

In case of overload the motor is shut down by a **self-hold thermal cutout** in the winding.
Attention: Reset possible only manually. Switch off the pump or isolate the equipment from mains. Identify and eliminate the cause of failure. Wait approx. five minutes before restarting the pump.

Attention: In case of **supply voltage below 100V**, the lock of the cutout might be restricted and the pump might restart on its own after sufficient cooling down. Take suitable precautions, if an automatic restart of the pump might lead to a critical dangerous situation.

The A-weighed emission sound pressure level of the pump does not exceed 70 dB(A). Measurement according to EN ISO 2151:2004 and EN ISO 3744:1995 with standard silencer or exhaust tube at outlet.

Maintenance and repair

NOTICE

Wear parts have to be replaced regularly. In case of normal wear the lifetime of the diaphragms and valves is > 10000 operating hours. Bearings have a typical durability of 40000 h. Motor capacitors have a typical durability in the range of 10000 to 40000 h depending strongly on the operation conditions like ambient temperature, humidity or load.

⚠CAUTION

- Check every capacitor regularly by measuring its capacity and estimating its operation time. Exchange old capacitors early enough to prevent a failure. If an overaged motor capacitor fails it might get hot and even melt and may cause a flame to form which could be **dangerous for persons and equipment in the vicinity**. The capacitors have to be replaced by an electrician.

➨ **Isolate equipment from mains** and **wait two minutes** before starting maintenance to allow the capacitors to discharge.
➨ Before starting maintenance, wait **two minutes** after isolating the equipment from mains to allow the capacitors to discharge.

⚠WARNING

☞ **Ensure that the pump cannot be operated accidentally. Never operate the pump if covers or other parts of the pump are disassembled. Never operate a defective or damaged pump.**
☞ **Attention**: The pump might be contaminated with process chemicals which have been pumped during operation. Ensure that the pump is decontaminated before maintenance and take adequate precautions to protect people from the effects of dangerous substances if contamination has occurred.

⚠CAUTION

- Before starting maintenance vent the pump, isolate the pump and other components from the vacuum system. Allow sufficient cooling of the pump. Drain condensate, if applicable.

Ensure that **maintenance** is done only by suitably trained and supervised technicians. Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.
In order to comply with law (occupational, health and safety regulations, safety at work law and regulations for environmental protection) vacuum pumps, components and measuring instruments returned to the manufacturer can be repaired only when certain procedures (see section **"Notes on return to the factory"**) are followed.

Additional safety information for diaphragm pump ME 4R NT

Intended use

⚠WARNING

☞ Comply with notes on how to connect the equipment correctly to vacuum and pressure systems, see section "Use and operation".

NOTICE

Use the equipment **for the intended use only**, i.e. to generate vacuum or to compress gases in vessels designed for that purpose.

Setting up and installing the equipment

⚠WARNING

☞ When **operating the pump as a pressure pump**, ensure that the maximally generated overpressure is compatible with the mechanical stability of the pressure vessel. Overpressure may be generated only in vessels which are designed for that purpose. **Risk of bursting!**
Attention: Obey the maximally admissible pressure (**4 bar absolute**) at the outlet. The pump has an overpressure safety relief device at the pressure adjustment device at the outlet (opening pressure: 4 bar absolute). If necessary install an additional overpressure safety relief device in the pressure system. Flexible elements tend to expand when pressurised.
☞ Do not permit any **uncontrolled pressurizing** (e.g. make sure that the exhaust pipeline cannot become blocked). **Risk of bursting!**
☞ Especially when using the pump as vacuum pump ensure a free and pressureless exhaust pipeline.

⚠CAUTION

- Obey **maximum permitted pressures** at inlet and outlet and pressure differences between inlet and outlet, see section "Technical data". Do not start the pump with overpressure at the inlet.

Technical data

Type		ME 4 NT	MZ 2 NT	MZ 2S NT	MZ 2D NT
Maximum pumping speed 50/60 Hz (ISO 21360)	m^3/h	4.0 / 4.4	2.2 / 2.4	2.0 / 2.3	2.3 / 2.5
Ultimate vacuum (absolute)	mbar	70	7		4
Maximum permissible outlet pressure (absolute)	bar	2			1.1
Maximum pressure difference between inlet and outlet	bar	2			1.1
Permissible ambient temperature storage / operation	°C	-10 to +60 / +10 to +40			
Permissible relative atmospheric moisture during operation (no condensation)	%	30 to 85			
Rated motor power	W	180			
No-load speed 50/60 Hz	min^{-1}	1500 / 1800			
Maximum permissible range of supply voltage (±10%) **Attention: Observe specifications of rating plate!** Dual voltage motor		100-115 V~ 50/60 Hz, 120V~ 60 Hz 230 V~ 50/60 Hz 100-115 V~ 50/60 Hz, 120 V 60 Hz / 200-230 V~ 50/60 Hz			
Maximum rated current at: 100-115 V~ 50/60 Hz, 120 V~ 60 Hz 200-230 V~ 50/60 Hz 230 V~ 50/60 Hz	 A A A	 3.4 1.8 1.8			
Device fuse		slow blow fuse 6.3A			
Motor protection		thermal cutout, manual reset			
Degree of protection IEC 529		IP 40			
Inlet		hose nozzle DN 10 mm			small flange KF 16
Outlet		silencer			
Dimensions L x W x H approx.	mm	243 x 239 x 198			243 x 242 x 198
Weight approx.	kg	11.0			11.4

We reserve the right for technical modifications without prior notice!

Type		ME 8 NT	ME 8S NT	MD 4 NT	MV 2 NT
Maximum pumping speed 50/60 Hz (ISO 21360)	m^3/h	7.3 / 8.1	7.1 / 7.8	3.8 / 4.3	2.2 / 2.4
Ultimate vacuum (absolute)	mbar	70		1	0.5
Maximum permissible outlet pressure (absolute)	bar	2		1.1	
Maximum pressure difference between inlet and outlet	bar	2		1.1	
Permissible ambient temperature storage / operation	°C	-10 to +60 / +10 to +40			
Permissible relative atmospheric moisture during operation (no condensation)	%	30 to 85			
Rated motor power	W	250			
No-load speed 50/60 Hz	min^{-1}	1500 / 1800			
Maximum permissible range of supply voltage (±10%) **Attention: Observe specifications of rating plate!**		100V~ 50/60 Hz 120 V~ 60 Hz		100-115 V~ 50/60Hz, 120 V~ 60 Hz -	
Dual voltage motor		230 V~ 50/60 Hz 100-115 V~ 50/60 Hz, 120 V~ 60 Hz / 200-230 V~ 50/60 Hz			
Maximum rated current at:					
100 V~ 50/60 Hz	A	5.0			
120 V~ 60 Hz	A	4.0			
230 V~ 50/60 Hz	A	3.0			
100-115 V~ 50/60 Hz 120 V~ 60 Hz	A	5.7			
200-230 V~50/60 Hz	A	3.0			
Device fuse		slow blow fuse 6.3A			
Motor protection		thermal cutout, manual reset			
Degree of protection IEC 529		IP 40			
Inlet		hose nozzle DN 10 mm		small flange KF 16	
Outlet		2x silencer		silencer	
Dimensions L x W x H approx.	mm	325 x 239 x 198			
Weight approx.	kg	16.4			

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Type		ME 4R NT
Maximum pumping speed 50/60 Hz (ISO 21360)	m^3/h	3.8 / 4.2
Ultimate vacuum (absolute)	mbar	100
Maximum permissible outlet pressure (absolute)	bar	4
Maximum permissible outlet pressure (reading of manometer)	bar	3
Maximum pressure difference between inlet and outlet	bar	4
Permissible ambient temperature storage / operation	°C	-10 to +60 / +10 to +40
Permissible relative atmospheric moisture during operation (no condensation)	%	30 to 85
Rated motor power	W	180
No-load speed 50/60 Hz	min^{-1}	1500 / 1800
Maximum permissible range of supply voltage **Attention: Observe specifications of rating plate!**		230V~ 50/60 Hz ±10%
Maximum rated current at: 230 V~ 50/60 Hz	A	1.8
Device fuse		slow blow fuse 6.3A
Motor protection		thermal cutout, manual reset
Degree of protection IEC 529		IP 40
Inlet		hose nozzle DN 10 mm
Outlet		hose nozzle DN 10 mm
Dimensions L x W x H approx.	mm	243 x 239 x 290
Weight approx.	kg	11.5

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Gas inlet temperatures

Operating condition	Inlet pressure	Permitted range of gas temperatures at inlet
Continuous operation	> 100 mbar (high gas load)	+10°C to +40°C
Continuous operation	< 100 mbar (low gas load)	0°C to +60°C
Short-time (< 5 minutes)	< 100 mbar (low gas load)	-10°C to +80°C

Wetted parts

Components	Wetted materials
Housing cover	aluminium alloy (AlMgSi0,5 or AlSi12)
Head cover	aluminium alloy (AlSi12)
Diaphragm clamping disc	aluminium alloy (AlSi12)
Diaphragm clamping disc (MZ 2S NT / ME 8S NT)	ETFE carbon fibre reinforced
Diaphragm	FPM
Diaphragm (MZ 2S NT / ME 8S NT / ME 4R NT)	PTFE
Valves	FPM
Valves (MZ 2D NT)	FPM / PTFE
Valves (MZ 2S NT / ME 8S NT)	FFKM
Valves (ME 4R NT)	PTFE
O-rings	FPM
Connection tube	aluminium alloy (AlMgSi0,5)
Connection piece (MV 2 NT)	aluminium alloy
Small flange	stainless steel
Hose nozzle	PBT
Hose nozzle (ME 4 NT)	stainless steel
Silencer	PA / PE / aluminium or aluminium alloy / silicone
Fittings (ME 4(R) NT / MZ 2 NT / MZ 2D NT)	aluminium, anodized
Hose (ME 4(R) NT / MZ 2 NT / MZ 2D NT)	PE
Hose (MZ 2S NT)	PTFE
Seal rings (ME 4(R) NT / MZ 2 NT / MZ 2D NT)	PVC
Vacuum / pressure adjustment device (ME 4R NT)	
O-ring	NBR
Valve block	aluminium alloy
Seal ring at manometer	copper
Hollow bolt, dispensing screw	stainless steel
Overpressure safety relief device	FPM

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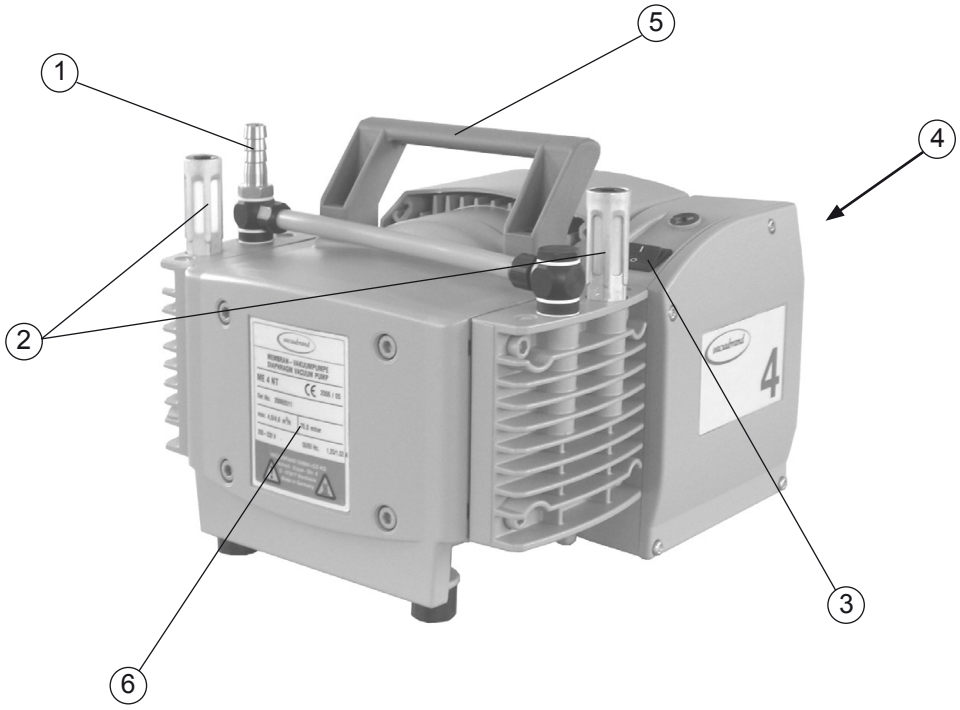
Pump parts

Position	Component
1	Inlet
2	Outlet
3	On/off switch
4	Mains connection
5	Handle
6	Pump rating plate
7	Fan
8	Inlet with vacuum adjustment device
9	Outlet with pressure adjustment device
10	Dispensing screw
11	Overpressure manometer
12	Vacuummeter
13	Overpressure safety relief device

ME 4 NT



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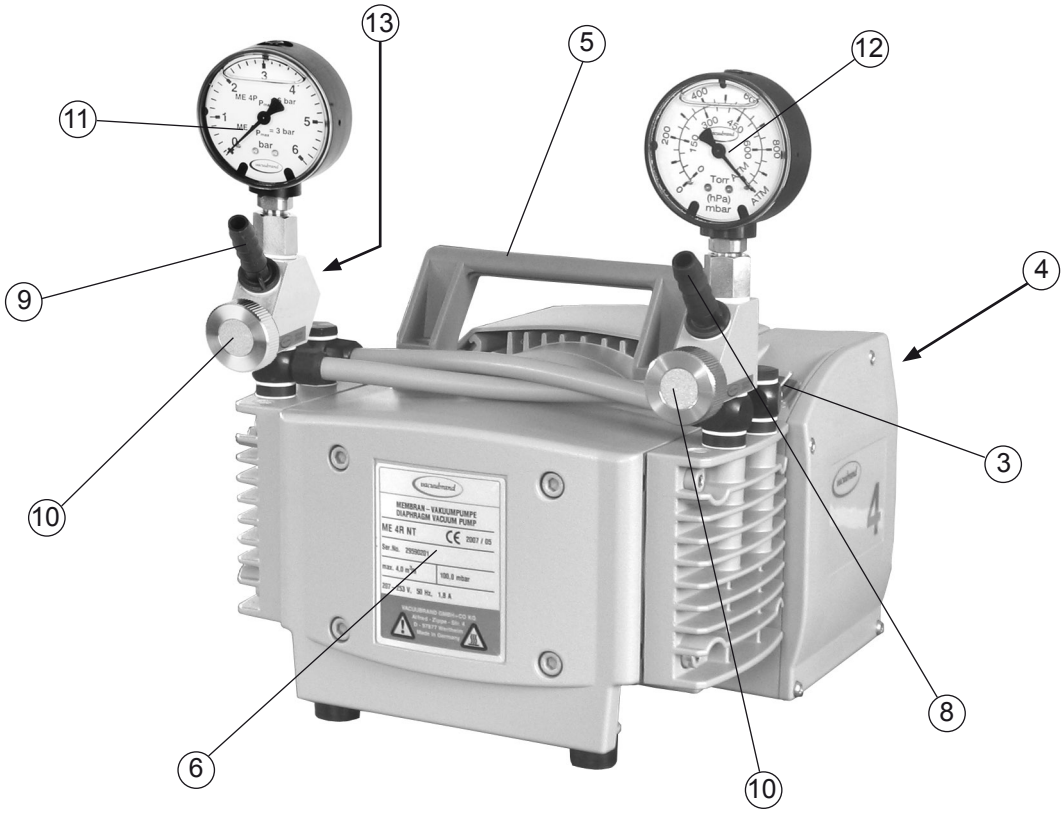
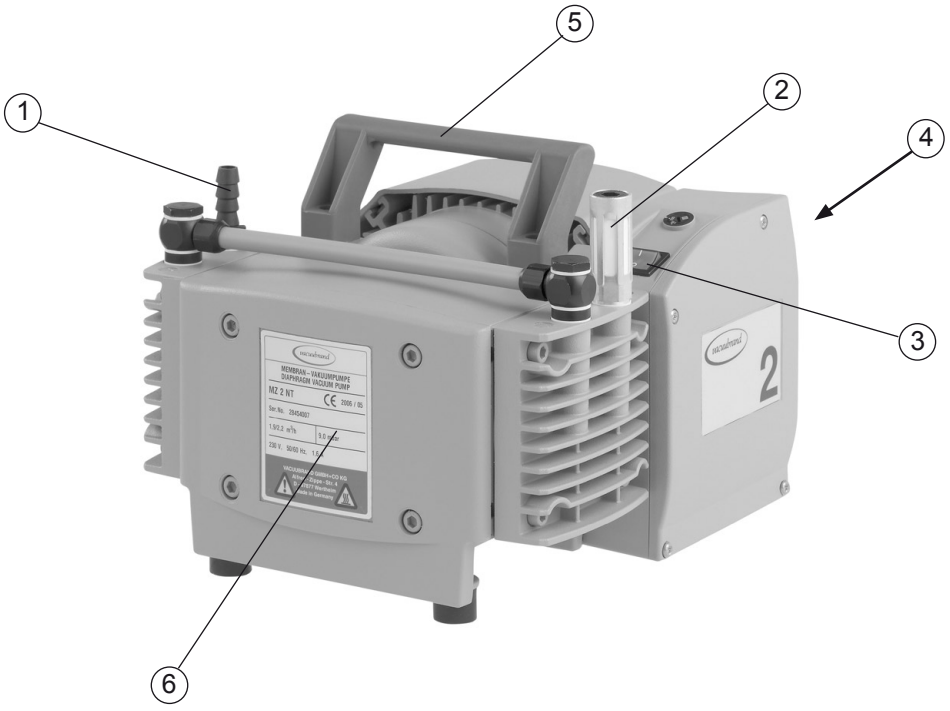
ME 4R NT

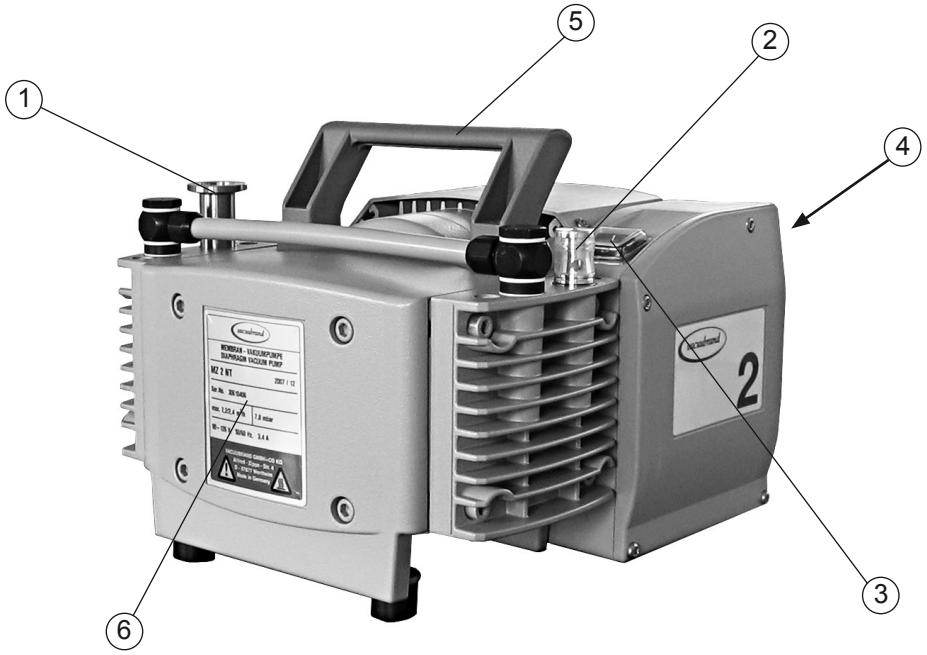


MZ 2 NT / MZ 2S NT

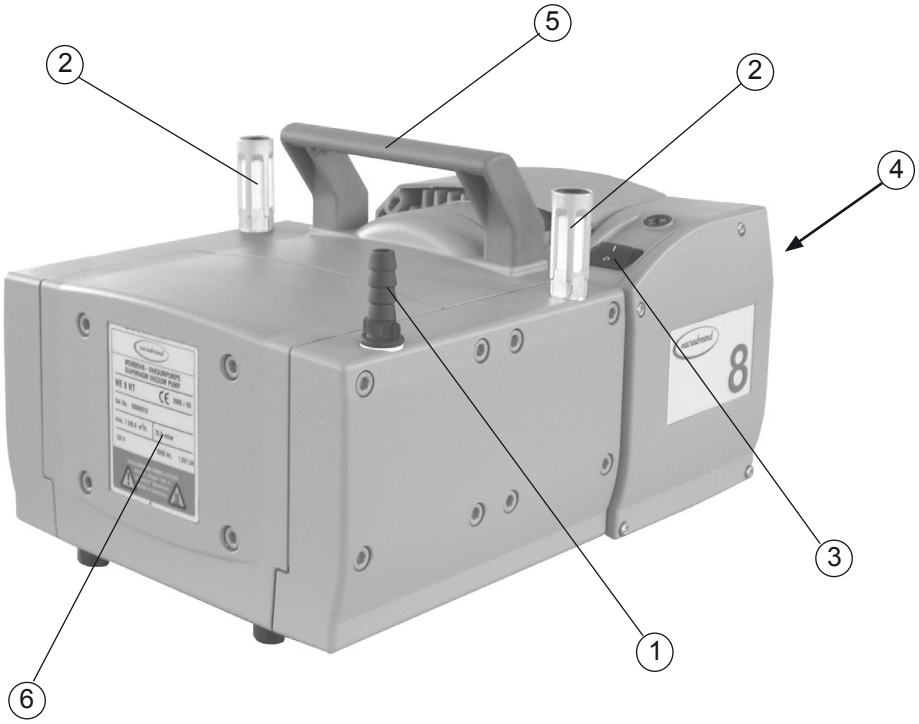
(fig.: MZ 2 NT)



MZ 2D NT



ME 8 NT / ME 8S NT



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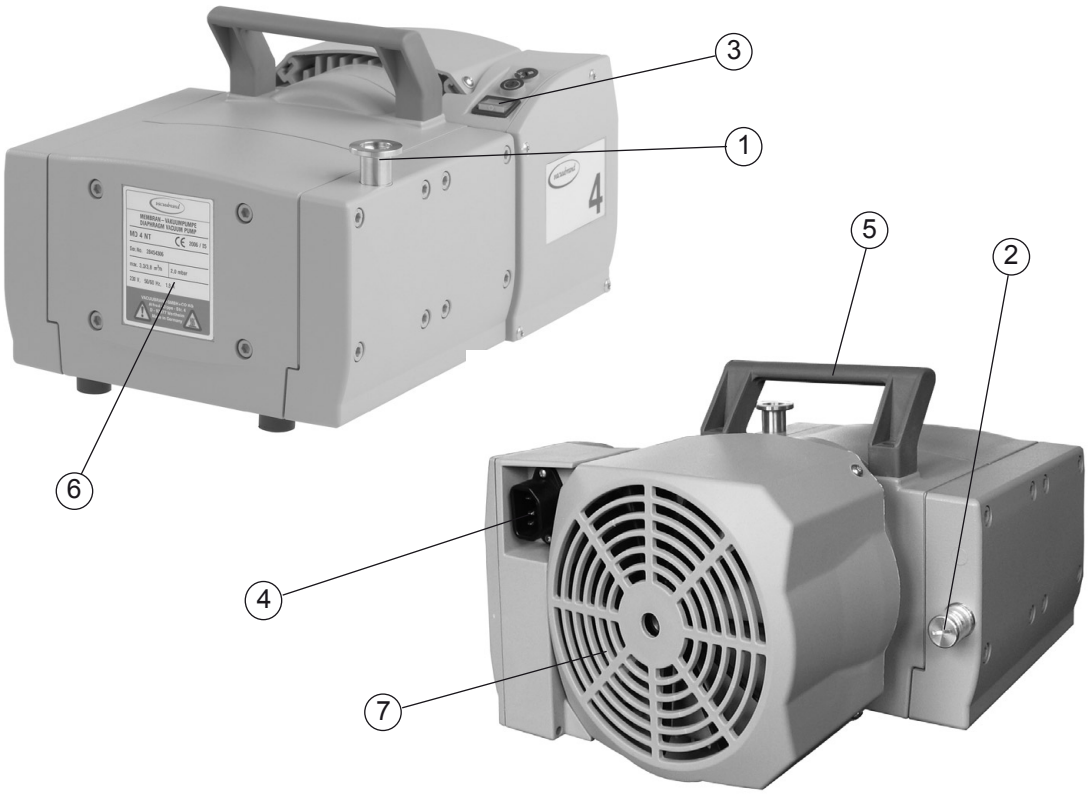
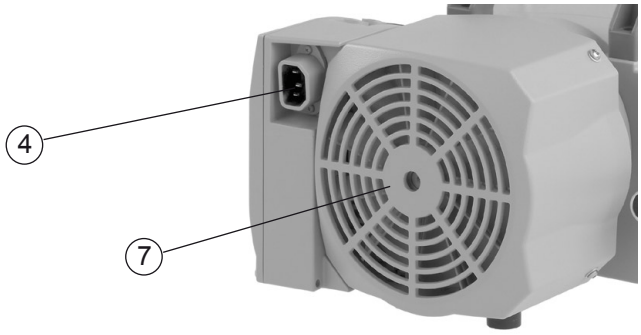
MD 4 NT / MV 2 NT
(fig.: MD 4 NT)



Mains connection **(all pump designs)**



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Use and operation

Installing in a vacuum system

⚠CAUTION

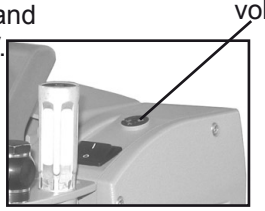
- Connection lines at the pump inlet have to be gas tight. Particles and dust must not be aspirated, the user has to provide appropriate filters if necessary. The user must ensure their suitability concerning gas flow, chemical resistance and safeness against clogging prior to use.
- Connect an exhaust line gas tight at the pump outlet if necessary. Always dispose of exhaust gases appropriately (e.g. into a fume hood). If there is risk of release of dangerous or polluting fluids, install an appropriate system to catch and dispose of those fluids.

- Reduce the transmission of vibration and prevent mechanical load due to rigid pipelines. Insert elastic hoses or flexible elements as couplings between the pump and rigid pipes. **Attention:** Flexible elements tend to shrink when evacuated.
- The gas outlet must never be blocked. The exhaust line has always to be free (pressureless) to ensure an unimpeded discharge of gas.

- A power failure may cause unintentional ventilation of the pump. In case this constitutes a potential source of danger, take appropriate safety measures.

- **Pump with dual-voltage motor**: Check that the voltage changeover switch at the terminal box is positioned correctly.
  Attention: If the pump is switched on with wrong voltage selection, the motor may be damaged!
  Before starting the pump, check that the voltage changeover switch at the terminal box is correctly positioned.
  Change the selection at the voltage changeover switch only if the pump is separated from mains.

Voltage changeover switch:
Use a screw driver to adjust the supply voltage on the **voltage changeover switch** at the terminal box of the pump:
”115” corresponds to 90-126 V and
”230” corresponds to 180-253 V.



⚠CAUTION

- Make sure ventilation is adequate especially if the pump is installed in a housing or if the ambient temperature is elevated. Provide external ventilation if necessary.

ME 4R NT

- When operating the device as a **compressor** ensure that the maximally generated overpressure is compatible with the mechanical stability of the pressure vessel. If necessary install an overpressure safety relief device.
- When **operating the equipment as vacuum pump** make sure that the exhaust pipeline cannot get blocked. Ensure a free (pressureless) exhaust of gases.

NOTICE

Avoid throttling losses by using connecting pipes with large diameter and by keeping them as short as possible.
Install outlet pipelines always falling to avoid backflow of condensate towards the pump.

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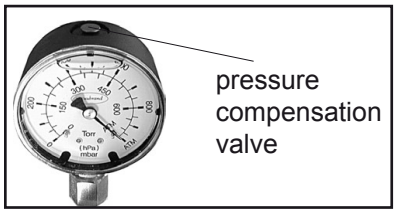
Use of a suitable valve to isolate the pump from the vacuum system is recommended to allow the pump to warm up before pumping condensable vapours or to clean the pump before it is switched off.
When assembling, ensure **vacuum-tightness**. After assembly, check the whole system for leaks.
Secure hose connections at the pump appropriately against unintentional detaching.

Notes prior to the use of the manometers (only ME 4R NT):
The manometers used are manometers with glycerin filling. The overpressure manometer indicates the overpressure relative to the atmospheric pressure at the place of installation. The vacuum meter indicates the absolute pressure.
Install the pump in the room of operation.
Prior to use the reference chambers have to be ventilated.
Else, not ventilating the manometer may lead to a systematic measuring error.



Ventilate the manometer using the pressure compensation valve. Close the valve after ventilation.
☞ Repeat if necessary until dial shows zero with measuring connection ventilated to atmosphere.

During operation

⚠CAUTION

- **Maximum ambient temperature**: 40 °C
- Make sure ventilation is adequate especially if the pump is installed in a housing or if the ambient temperature is elevated.
- **Potentially dangerous gases or vapours** at the outlet of the pump have to be drained and disposed appropriately.
- Due to the high compression ratio of the pumps, the pressure at the outlet port might get higher than the maximally permitted pressure compatible with the **mechanical stability** of the system. Ensure that the pump outlet is not blocked or restricted.

ME 4R NT:
- **Attention**: Do not unscrew the dispensing screw completely! There are no stops at the end of the threads!

NOTICE

If the pump is installed in altitudes of more than 1000 m above mean sea level check compatibility with applicable safety requirements, especially IEC 60034 (motor might overheat due to insufficient cooling).
Do not start the pump if the **pressure difference between inlet and outlet ports** exceeds **max. 1.1 bar**. Attempts to start the pump at higher difference may cause blockade and damage of the motor.
Check compatibility with **maximally permitted pressure** at outlet and **maximum pressure difference** between inlet and outlet ports.

ME 4R NT:
For continuous operation at inlet pressures above atmospheric pressure the inlet pressure must not exceed the outlet pressure. The maximally permitted pressure at the outlet is 4 bar absolute.

Operating the pump at high inlet pressure or pumping dusty gases for a long time may cause clogging of the silencer. Check the silencer regularly and replace or install a hose nozzle (order no. 639758) with clamping ring (order no. 639729) instead.

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Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amounts.
Check the pump regularly for external soiling and deposits, clean if necessary to avoid an increase of the pump‘s operating temperature.

In case of excess temperature, the motor is shut down by a **thermal cutout** in the winding. Attention: Reset possible only manually. Switch off the pump or isolate the equipment from mains. Determine and eliminate the cause of failure. Wait approx. five minutes before restarting the pump.
Attention: In case of **supply voltage below 100V**, the lock of the cutout might be restricted and the pump might restart on its own after sufficient cooling down. Take suitable precautions, if an automatic restart of the pump might lead to a dangerous situation.

A warm up period (approx. 15 min.) is required to ensure that the rated ultimate vacuum and pumping speed are attained.

ME 4R NT:
Use the vacuum adjustment device at the inlet port of the pump to **control the vacuum** in the system. By turning the dispensing screw the amount of gases pumped from the vacuum system can be controlled:
- Turning the dispensing screw to the left: vacuum is decreased (higher pressure) (Pump additionally takes in bleed air via dispensing screw.)
- Turning the dispensing screw to the right: vacuum is increased (lower pressure)

The **overpressure** at the outlet port of the pump is controlled accordingly via the pressure adjustment device:
- Turning the dispensing screw to the left: pressure is decreased (Pump blows off via dispensing screw.)
- Turning the dispensing screw to the right: pressure is increased (**attention**: max. 4 bar permitted!)

Shutdown

NOTICE

Short-term:
Has the pump been exposed to condensate?
Allow the pump to continue to run at atmospheric pressure for a few minutes.
Has the pump been exposed to media which may damage the pump materials or form **deposits**?
Check and clean pump heads if necessary.

Long-term:
Take measures as described in section short-term shutdown.
Separate pump from the apparatus.
Close inlet and outlet port (e. g. with transport caps).
Store the pump in dry conditions.

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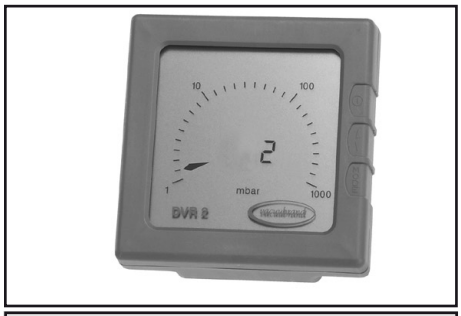
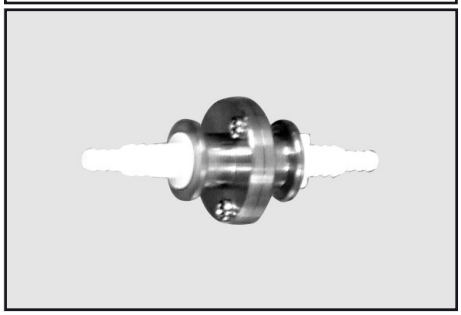
Accessories



Digital vacuum gauge DVR 2 .....**682902**

Vacuum hose (caoutchouc) 10 mm ID **686002**



Non return valve (flapper valve) **639683**
(Simultaneous operation of two systems at different pressure levels, stainless steel/FFKM, leak rate < 10^{-3} mbar x l/s for pressure differences $\geq$ 500 mbar.)

For additional accessories such as vacuum valves, small-flange components, vacuum gauges or vacuum controllers refer to www.vacuubrand.com

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Troubleshooting

Fault	Possible cause	Remedy
❑ Pump does not start or stops immediately.	➡ Mains not plugged in, electrical supply failure?	✓ Plug in mains. Check fuse.
	➡ Device fuse blown?	✓ Identify cause of failure. Replace device fuse.
	➡ Pressure in outlet pipeline or in the system (at outlet side) too high?	✓ Remove blockade in line, open valve, or reduce overpressure in the system (pressure adjustment device ME 4R NT).
	➡ Motor overloaded?	✓ Allow motor to cool down, identify and eliminate cause of failure. Manual reset is necessary. Switch off pump or unplug mains.
❑ Pump does not achieve its ultimate vacuum or usual pumping speed.	➡ Centring ring at small flange connection not correctly positioned or leak in the pipeline or vacuum system?	✓ Check pump directly - connect vacuum gauge directly at pump inlet - then check connection, pipeline and vacuum system if necessary.
	➡ Vacuum adjustment device open (ME 4R NT)?	✓ Close vacuum adjustment device.
	➡ Long, narrow line?	✓ Use lines with larger diameter, length as short as possible.
	➡ Pump has been exposed to condensate?	✓ Allow pump to run for some minutes with atmospheric pressure at the inlet.
	➡ Deposits have been formed inside the pump?	✓ Clean and inspect the pump heads.
	➡ Diaphragms or valves damaged?	✓ Replace diaphragms and/or valves.
	➡ Outgassing substances or vapour generated in the process?	✓ Check process parameters.
❑ Pump too noisy.	➡ Atmospheric or high pressure at the pump inlet?	✓ Connect hose or silencer to pump outlet.
	➡ Diaphragm crack or diaphragm clamping disc loose?	✓ Perform maintenance.
	➡ Other than above mentioned causes?	✓ Contact local distributor.
❑ Pump seized.		✓ Contact local distributor.

NOTICE

A service manual with exploded view drawings, spare parts list and directions for repair is available on request.

☞ The service manual is intended for trained service people only.

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Replacing diaphragms and valves

NOTICE

All bearings are encapsulated and are filled with long-life lubricant. Under normal operating conditions, the pump is maintenance free. The valves and diaphragms as well as the motor capacitors are wear parts. If the rated ultimate vacuum is no longer achieved or in case of increased noise level, the pump interior, the diaphragms and the valves must be cleaned and the diaphragms and valves must be checked for cracks or other damage. Check every capacitor regularly by measuring its capacity and estimating its operation time. Exchange old capacitors early enough to prevent a failure. The capacitors have to be replaced by an electrician. Depending on individual cases it may be efficient to check and clean the pump heads on a regular basis. In case of normal wear the lifetime of the diaphragms and valves is > 10000 operating hours.

- Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amount.

If the pump is exposed to corrosive gases or vapour or in case of deposits, maintenance should be carried out frequently.

- Regular maintenance will improve the lifetime of the pump and also protect both man and environment.

Ensure that maintenance is done only by suitable trained and supervised technicians.

⚠WARNING

☞ Ensure that the pump cannot be operated accidentally. **Never operate the pump if covers or other parts of the pump are disassembled. Never operate a defective or damaged pump.**

☞ **Before starting maintenance** isolate the pump from the electrical supply and wait **two minutes** after isolating the equipment from mains to allow the capacitors to discharge. Avoid the release of pollutants. Allow sufficient cooling of the pump.

⚠CAUTION

- Attention: The pump might be contaminated with the process chemicals that have been pumped during operation. Ensure that the pump is decontaminated before maintenance and take adequate precautions to protect people from the effects of dangerous substances if contamination has occurred. Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.
- Wear appropriate safety-clothing when you come into contact with contaminated components. Avoid the release of pollutants.

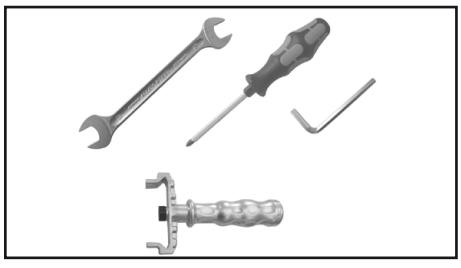
NOTICE

Before starting maintenance vent the pump and isolate it from the vacuum system.

Set of seals for **ME 4 NT, MZ 2 NT** **696860**
Set of seals for **MD 4 NT, MV 2 NT** **696861**
Set of seals for **ME 8 NT** **696862**
Set of seals for **MZ 2D NT** **696863**
Set of seals for **MZ 2S , ME 8S NT** (2x) **696868**
Set of seals for **ME 4R NT** **696859**
Diaphragm key (w/f 66) **636554**

☞ **Please read section ”Replacing diaphragms and valves” completely before star-ting maintenance.**

Partially the pictures show pumps in other versions. This doesn’t influence replacing diaphragms and valves of the pump.



Tools required (metric):

- Phillips screw driver size 2 (MZ 2D NT)
- Open-ended wrench w/f 17 / 20 (ME 4(R) NT, MZ 2(D, S) NT)
- Hex key size 5
- Diaphragm key w/f 66

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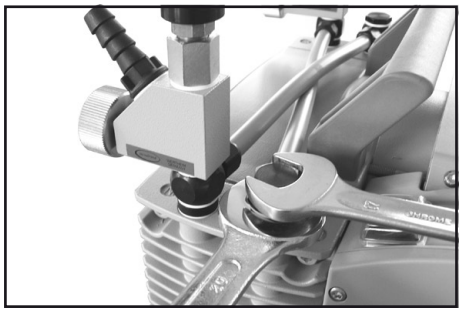
Cleaning and inspecting the pump heads



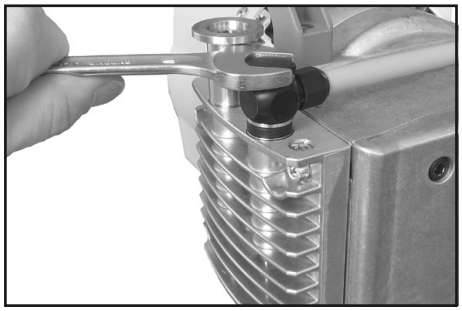
ME 4R NT:

➨ Use open-end wrench (w/f 17) to remove the screw-in fitting from the pump head (steady fitting with a second open-end wrench w/f 20) and remove together with connecting hose.

ME 4R NT:

➨ Unscrew hollow bolt (stainless steel) at adjustment device together with manometer using an open-end wrench w/f 17 (steady fitting with a second open-end wrench w/f 20).

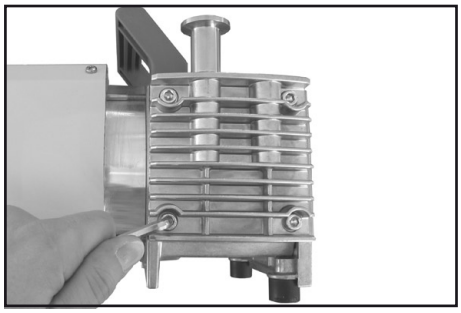
➨ Dismount vacuum/pressure adjustment device together with manometer.

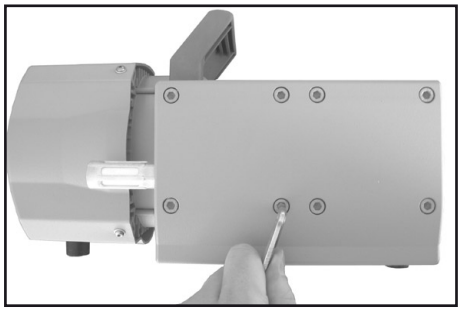


ME 4 / MZ 2(D):

➨ Use an open-ended wrench w/f 17 to remove the screw-in fitting and the connecting tube from the pump head. In case, counterhold with open-ended wrench w/f 20.

➨ Position the pump on the side. Support pump appropriately if necessary. Open only one side of the pump at a time.





➨ To check the valves use a hex key to remove four (ME 4(R) NT / MZ 2(D, S) NT) or eight (ME 8 NT / MD 4 NT / MV 2 NT) socket-head screws from the pump head and remove the housing cover with head cover, valves and O-rings (MD 4 NT / MV 2 NT / MZ 2S NT only).

☞ Never remove parts by using a spiky or sharp-edged tool (e.g. screw driver), we recommend to use a rubber mallet or compressed air (to be blown **carefully** into port).

➨ Remove the head cover carefully from the housing cover. Note the position of the valves and remove them.

☞ Replace valves if necessary.

☞ Use petroleum ether or industrial solvent to remove deposits. Do not inhale.

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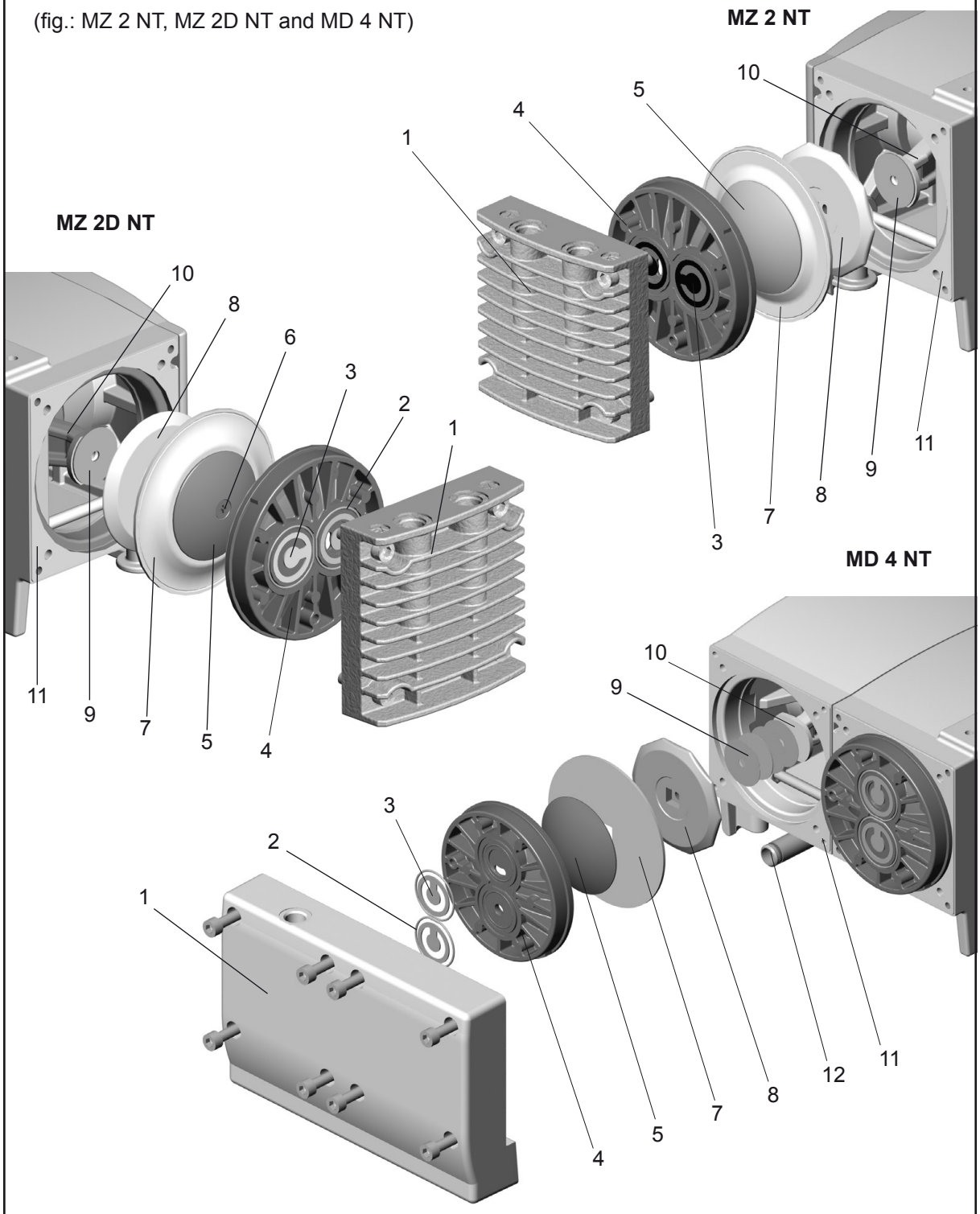
View of the disassembled pump head parts

(fig.: MZ 2 NT, MZ 2D NT and MD 4 NT)



Pump head parts:

1: Housing cover
2: O-rings (not ME 8 NT)
3: Valves
4: Head cover
5: Diaphragm clamping disc with square head screw (MZ 2D NT: with countersunk head screw)
6: Countersunk head screw
7: Diaphragm
8: Diaphragm support disc
9: Washer
10: Connecting rod
11: Housing
12: Connecting tube with O-ring

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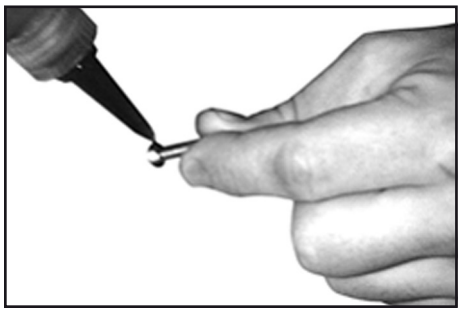
☞ **ME 8 NT / MD 4 NT / MV 2 NT**: Underneath the pump there is a connecting tube (MV 2 NT: with connecting block) between the two housing covers. The connecting tube is merely stuck into the housing covers and sealed with seal rings at the connecting tube's ends. If the housing cover is removed, the connecting tube becomes detached as well.

Replacing the diaphragm

Replacing the diaphragms of a pump MZ 2D NT:

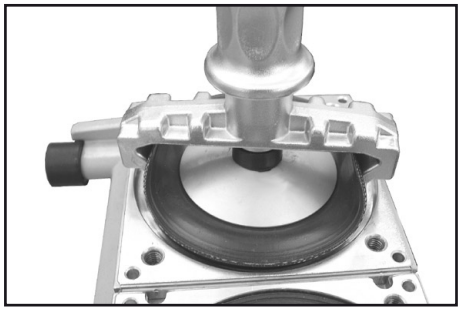
☞ Check the diaphragm for damage and replace if necessary.
➨ Use a Phillips screw driver to remove the countersunk head screw in the centre of the diaphragm clamping disc.
☞ **Attention:** The screw is secured with adhesive against loosening. Clean the screw or use a new one (cat. no.: 63 98 47).
☞ If the old diaphragm is difficult to separate from the support disc, immerse the assembly in naphtha or petroleum ether. Do not inhale!
➨ Check for washers between the diaphragm support disc and the connecting rod. **Do not mix the washers from different pump heads**. Make sure that the original number is reassembled at the individual pump head.
☞ Smaller number of washers: The pump will not attain ultimate vacuum. More washers: The clamping disc will hit the head cover; noise or even blockade and damage of the pump.



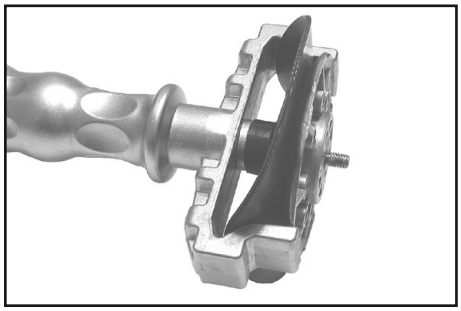
☞ **Attention:** Double diaphragm consisting of two single diaphragms! Put the two diaphragms together with the printed sides outwards.
➨ Apply a drop of adhesive (OmniFit® 50M or Loctite® 243) to the lower side of the screw head and the thread and screw diaphragm clamping disc, diaphragm, diaphragm support disc and washers (if applicable) to connecting rod.

OmniFit® and Loctite® are registered trade marks of Henkel Technologies

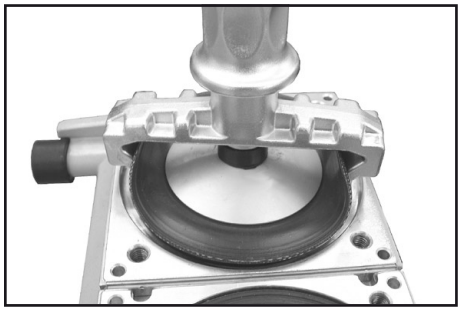
Replacing the diaphragms of pumps ME 4 NT, MZ 2(S) NT, ME 8 NT, MD 4 NT, MV 2 NT:



☞ Check the diaphragm for damage and replace if necessary.
➨ Lift the diaphragm carefully sidewise.
☞ Never use a spiky or sharp-edged tool to lift the diaphragm.
➨ Use the diaphragm key to grip the diaphragm support disc under the diaphragm. Unscrew the diaphragm support disc with diaphragm and diaphragm clamping disc.
☞ If the old diaphragm is difficult to separate from the support disc, immerse assembly in naphtha or petroleum ether. Do not inhale!
➨ Check for washers between the diaphragm support disc and the connecting rod. **Do not mix the washers from the different pump heads**. Make sure that the original number is reassembled at the individual pump head.
☞ Smaller number of washers: The pump will not attain ultimate vacuum. More washers: Clamping disc will hit head cover; noise or even blockade and damage of the pump.

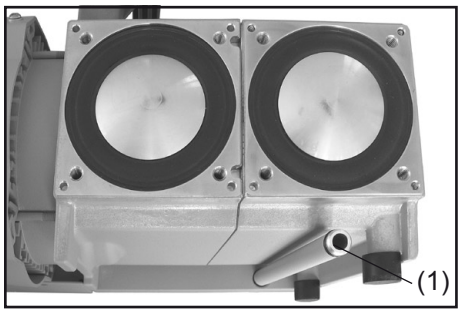


- ➨ Position the new diaphragm between the diaphragm clamping disc with square head screw and the diaphragm support disc.
- ☞ **Attention:** Double diaphragm! Put the two diaphragms together with the printed sides outwards (not MZ 2S NT).
- ☞ **Attention** (only MZ 2S NT): Position diaphragm with pale side towards diaphragm clamping disc (to pump chamber).
- ☞ Make sure that the square head screw of the diaphragm clamping disc is correctly seated in the guide hole of the diaphragm support disc.
- ➨ Lift the diaphragm at the side and position it carefully together with the diaphragm clamping disc and the diaphragm support disc in the diaphragm key.
- ☞ Avoid damage of the diaphragm: Do not bend the diaphragm too much.

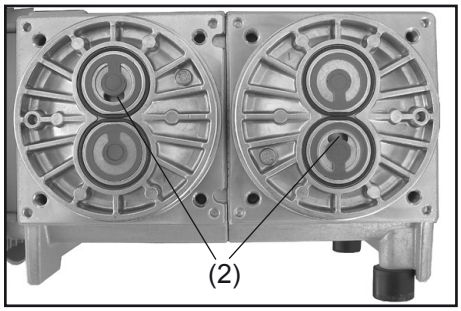


- ☞ Pay attention to washers. Do not remove, assemble the original number of washers between the support disc and the connecting rod.
- ➨ Screw diaphragm clamping disc, diaphragm, diaphragm support disc and washers (if applicable) to connecting rod.
- ➨ Optimum torque for the diaphragm support disc: **6 Nm**, use torque key. Attach torque key to diaphragm key (hexagonal bolt 6 mm wide).

Assembling pump heads

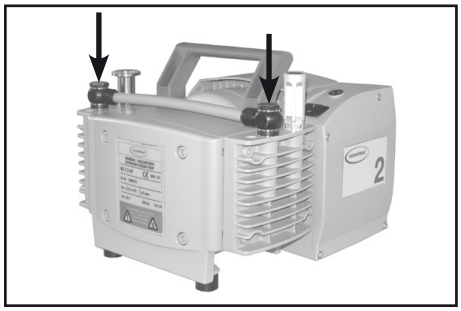


- ➨ Bring the diaphragms into a position in which they are in contact with the housing and centred with respect to the bore.
- ➨ **ME 8 NT, MD 4 NT, MV 2 NT**: When mounting the housing cover, install the connecting tube (1) under the pump between the two housing covers. Pay attention to the correct positions of the seal rings (replace if damaged) in the grooves at the ends of the tube. Stick the connecting tube in the bore of the housing cover. After the assembly the connecting tube may have some play.



Reassemble in reverse order.

- ➨ Install head cover, valves, O-rings (not ME 8 NT) and housing cover.
- ☞ Make sure that the diaphragm stays centric so that it will become clamped uniformly between housing and head cover.
- ➨ Put the head cover onto the housing.
- ☞ Orientation of the head cover: Align the nib at the head cover with the notch of the housing cover.
- ➨ Put the valves in place. In case install O-rings.
- ☞ Make sure that the **valves are correctly seated**: Valves at the outlet with round centred opening under valve, valves at the inlet with kidney-shaped opening of the head cover (2) beside valve.
- ➨ **Only MZ 2D NT**: Installing the white PTFE valves: at outlet of 1st stage and at inlet of 2nd stage (see fig.).



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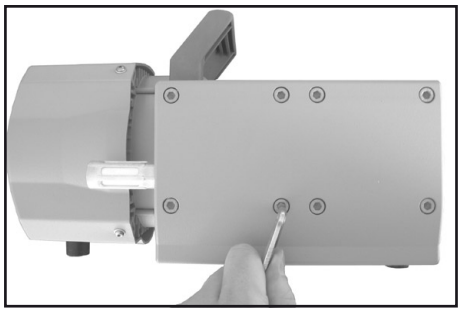
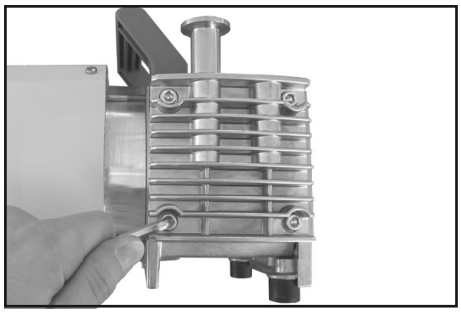
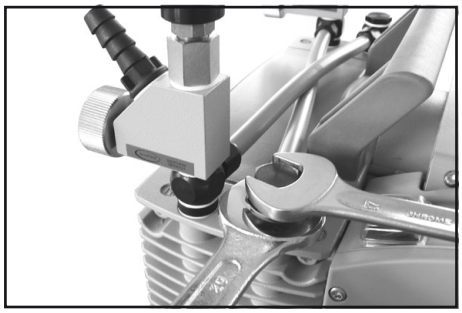


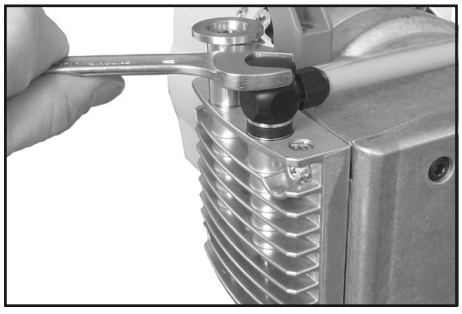


➨ Put housing cover in place.
☞ If it is not possible to position the housing cover, check the head cover for correct orientation. The nib at the head cover has to lock into the notch of the housing cover.
➨ **ME 8 NT, MD 4 NT, MV 2 NT**: Install the connecting tube (1) under the pump between the two housing covers.
➨ Screw in the socket head screws fixing the housing cover crosswise first slightly, then tighten.
☞ Torque **12 Nm**.

Assembling fittings (ME 4(R) NT, MZ 2(D, S) NT)

ME 4R NT:
➨ Screw on adjustment device with valve block and hollow bolt.
☞ Align valve block before tightening the hollow bolt.
➨ Tighten hollow bolt with open-end wrench w/f 7. Steady fitting with a second open-end wrench (w/f 20).





➨ Use an open-ended wrench w/f 17 to assemble the screw-in fittings with connection hose to the pump heads. In case, counterhold with an open-ended wrench w/f 20.

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➨ Position the diaphragm pump carefully on the other side, support pump appropriately. Perform maintenance of the remaining pump heads according to the description above.

If the pump does not achieve the ultimate vacuum:

☞ In case the diaphragms and valves have been replaced, a run-in period of several hours is required before the pump achieves its ultimate vacuum.

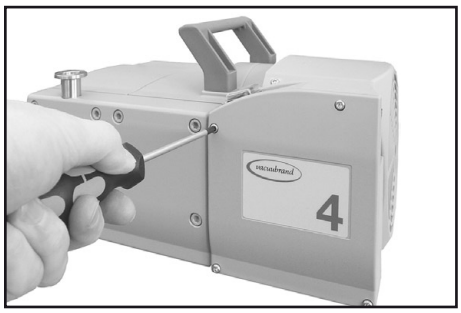
☞ In case of unusual noise switch off pump immediately and check clamping disc positions

If the pump does not achieve the ultimate total vacuum:
Check hose connectors between pump heads and manifolds for leaks. If necessary recheck pump chamber.

Replacing the device fuse

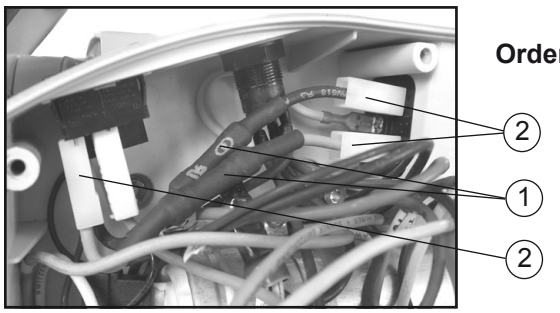
WARNING

The replacing of the device fuse has to be carried out by an **electrician**. Switch off the pump and disconnect it from mains before opening the terminal box. After disconnecting from mains wait two minutes to allow the capacitors to discharge. After replacing the fuse, the pump must be checked for electric safety (see below)! Identify and eliminate the cause of failure before switching on the pump again.



The pigtail fuses (slow blow fuse 6,3A) is built in in a wire (1, black and blue) inside the terminal box. To replace the fuses it is necessary to replace the whole wires (fixed with flat pin bushes (2)).

➨ Open the terminal box. Unscrew the four screws with a Torx screw driver TX20 and remove the terminal box cover. Remove the wire with the blown fuse (fixed with flat pin bushes (2), see figure). Mount the new wire (flat pin bushes) and close the terminal box. Fasten the cover with the four screws.



Order-no. Set of fuses NT.....636542

WARNING

Important: Check operability and safety of the pump after repair and after replacing the device fuse.

Check the electrical safety (protective conductor resistance, insulating resistance, high voltage test) according to IEC 61010 and national regulations.

Notes on return to the factory

Repair - return - DKD calibration

NOTICE

Safety and health of our staff, laws and regulations regarding the handling of dangerous goods, occupational health and safety regulations and regulations regarding safe disposal of waste require that for all pumps and other products the **"Health and safety clearance form"** must be send to our office duly completed and signed before any equipment is dispatched to our premises.
Fax or post a completed copy of the health and safety clearance form to us in advance. The declaration must arrive before the equipment. Enclose a second completed copy with the product. If the equipment is contaminated you must notify the carrier.
No repair / DKD calibration is possible unless the correctly completed form is returned. Inevitably, there will be a delay in processing the equipment if information is missing or if this procedure is not obeyed.

⚠CAUTION

If the product has come in contact with chemicals, radioactive substances or other substances dangerous to health or environment, the product must be decontaminated **prior to sending it back to the factory.**

- Return the product to us **disassembled and cleaned** and accompanied by a certificate verifying decontamination or
- Contact an industrial cleaning and **decontamination service** directly or
- Authorize us to send the product to an industrial cleaning facility **at your expense.**

To expedite repair and to reduce costs, please enclose a detailed description of the problem and the product's operating conditions with every product returned for repair.
We submit **quotations** only on request and always at the customer's expense. If an order is given, the costs incurred are offset from the costs for repair or from the purchase price, if the customer prefers to buy a new product instead of repairing the defective one.

- **If you do not wish a repair on the basis of our quotation, the equipment might be returned to you disassembled and at your charge!**

In many cases, the **components must be cleaned in the factory** prior to repair.
For cleaning we use an environmentally responsible water based process. Unfortunately the combined attack of elevated temperature, cleaning agent, ultrasonic treatment and mechanical stress (from pressurised water) may result in damage to the paint. Please mark in the health and safety clearance form if you wish a **repaint at your expense** just in case such a damage should occur.
We also replace parts due to optical aspects upon your request.

NOTICE

Before returning the equipment ensure that (if applicable):

- Equipment has been cleaned and/or decontaminated.
- All inlet and outlet ports have been sealed.
- Equipment has been properly packed, if necessary, please order an original packaging (costs will be charged), marked as appropriate and the carrier has been notified.
- Ensure that the completed health and safety declaration is enclosed.

We hope for your understanding for these measures, which are beyond our control.

Scrapping and waste disposal:
Dispose of the equipment and any components removed from it safely in accordance with all local and national safety and environmental requirements. Particular care must be taken with components and waste oil which have been contaminated with dangerous substances from the process. Do not incinerate fluoroelastomer seals and O-rings.

- You may authorize us to dispose of the equipment **at your expense.**

Health and safety clearance form

Declaration concerning safety, potential hazards and safe disposal of waste, e. g. used oil.

Safety and health of our staff, laws and regulations regarding the handling of dangerous goods, occupational health and safety regulations, safety at work laws and regulations regarding safe disposal of waste, e. g. waste oil, require that for all pumps and other products this form must be sent to our office duly completed and signed before any equipment is dispatched to our premises. **Products will not be accepted for any procedure, and handling and repair / DKD calibration will not start before we have received this declaration.**

a) Fax or post a **completed copy of this form** to us in advance. The declaration must arrive before the equipment. **Enclose a second, completed copy with the product.** If the product is contaminated you must notify the carrier (**GGVE, GGVS, RID, ADR**).

b) Inevitably, the repair process will be delayed considerably, if this information is missing or this procedure is not obeyed. We hope for your understanding for these measures which are beyond our control and that you will assist us in expediting the repair procedure.

c) **Make sure that you know all about the substances which have been in contact with the equipment and that all questions have been answered correctly and in detail.**

1. Product (Model): .....

2. Serial No.: .....

3. List of substances in contact with the equipment or reaction products:

3.1 Chemical/substance name, chemical symbol:

a) .....

b) .....

c) .....

d) .....

3.2 Important information and precautions, e. g. danger classification:

a) .....

b) .....

c) .....

d) .....

4. Declaration (please mark as applicable):

❑ **4.1 for non dangerous goods:**

We assure for the returned product that
- neither toxic, corrosive, biologically active, explosive, radioactive nor contamination dangerous in any way has occurred.
- the product is free of dangerous substances.
- the oil or residues of pumped media have been drained.

❑ **4.2 for dangerous goods:**

We assure for the returned product that
- all substances, toxic, corrosive, biologically active, explosive, radioactive or dangerous in any way which have been pumped or been in contact with the product are listed in 3.1, that the information is complete and that we have not withheld any information.
- the product, in accordance with regulations, has been
  ❑ cleaned ❑ decontaminated ❑ sterilized.

5. Way of transport / carrier:

.....

Day of dispatch to VACUUBRAND:

.....

If the paint is damaged, we wish a repaint or a replacement of parts due to optical aspects at our expense (see ”Notes on return to the factory”):

❑ yes
❑ no

We declare that the following measures - where applicable - have been taken:
- The oil has been drained from the product. **Important: Dispose of according to national regulations.**
- The interior of the product has been cleaned.
- All inlet and outlet ports of the product have been sealed.
- The product has been properly packed, if necessary, please order an original packaging (costs will be charged), and marked as appropriate.
- The carrier has been informed about the hazardous nature of the goods (if applicable).

We assure VACUUBRAND that we accept liability for any damage caused by providing incomplete or incorrect information and that we shall indemnify VACUUBRAND from any claims as regards damages from third parties.

We are aware that as expressed in § 823 BGB (Public Law Code of Germany) we are directly liable for injuries or damages suffered by third parties, particularly VACUUBRAND employees occupied with handling/repairing the product.

Signature: .....

Name (print): .....

Job title (print): .....

Company’s seal: .....

Date: .....

VACUUBRAND GMBH + CO KG
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CE

Konformitätserklärung / Declaration of conformity / Déclaration de conformité

Membranpumpe / Diaphragm pump / Pompe à membrane

ME 4 NT (230V; 731000, 731001, 731002)
ME 4R NT (230V; 731100, 731102)
MZ 2 NT (230V; 732000, 732001, 732002)
MZ 2D NT (230V, 732200, 732201, 732202)
MZ 2S NT (732100)
ME 8 NT (230V; 734000, 734001, 734002)
MD 4 NT (230V; 736000, 736001, 736002)
MV 2 NT (230V; 738000, 738001, 738002)

Hiermit erklären wir, dass das oben bezeichnete Gerät in Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Anforderungen der zutreffenden, aufgeführten EU-Richtlinien entspricht. Bei einer mit uns nicht abgestimmten Änderung an dem Gerät verliert diese Erklärung ihre Gültigkeit.
We herewith declare that the product designated above is in compliance with the basic requirements of the applicable EC-directives stated below with regard to design, type and model sold by us. This certificate ceases to be valid if the product is modified without the agreement of the manufacturer.
Par la présente, nous déclarons que le dispositif désigné ci-dessus est conforme aux prescriptions de base des directives EU applicables et indiqués en ci que concerne conception, dessin et modèle vendu par nous-mêmes. Cette déclaration cesse d´être valable si des modifications sont apportées au dispositif sans notre autorisation préalable.

Maschinenrichtlinie (mit Änderungen) / Machine directive (with supplements) / Directive Machines (avec des suppléments)
2006/42/EG
Niederspannungsrichtlinie / Low-Voltage Directive / Directive Basse Tension
2006/95/EG
Richtlinie Elektromagnetische Verträglichkeit / Electromagnetic Compatibility Directive / Directive Compatibilité Electromagnétique
2004/108/EG
Angewandte Harmonisierte Normen / Harmonized Standards applied / Normes Harmonisées utilisées
DIN EN 12100-2, DIN EN 61010-1, DIN EN 1012-2, DIN EN 61326-1
Managementsysteme / Management systems / Systèmes de Management
EN ISO 9001, EN ISO 14001 (1997-2006)

Wertheim, 25.07.2008
. . . . . .
Ort, Datum / place, date / lieu, date

. . . . . .
(Dr. F. Gitmans)
Geschäftsführer / Managing Director / Gérant

ppa. . . . . .
(Dr. J. Dirscherl)
Technischer Leiter / Technical Director / Directeur technique

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vacuubrand

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Certificate

TÜVRheinland®

Certificate no. CU 72081689 01

License Holder:
VACUUBRAND GMBH + Co. KG
Alfred-Zippe-Str. 4

97877 Wertheim
Germany

Manufacturing Plant:
VACUUBRAND GMBH + Co. KG
Alfred-Zippe-Str. 4

97877 Wertheim
Germany

Test report no.: USA-DS 30882017 001 **Client Reference:** M. von Przychowski

Tested to: UL 61010A-1:2002 R12.02
CAN/CSA-C22.2 No. 1010.1-92+A2:97

Certified Product: Diaphragm Vacuum Pump for Laboratory Use **License Fee - Units**

Model Designation: Mw xyyy NT yy z, PC 101 NT, PC 201 NT 7
(w=E,Z,D,V; x=2,4,6,8; y=A-Z, blank;
z=+AK, +EK, +2AK, +AK+EK, +AK+EK TE, +AK+EK Peltronik,
+AK SYNCHRO+EK, +AK+M+D, +IK+EK, blank)

Rated Voltage: 1) AC 100V, 50/60Hz; 2) AC 120V, 60Hz
3,4) AC 230V, 50/60Hz;
5,6) AC 100-115V, 50/60Hz; AC 120V, 60Hz
7,8) AC 100-115/200-230V, 50/60Hz;AC 120V, 60Hz
Rated Current: 1) 5A; 2) 4A; 3) 3A; 4) 1.8A;
5) 5.7A; 6) 3.4A; 7) 5.7/3.0A, 5.7A; 8) 3.4/1.8A, 3.4A
Protection Class: I

7

Appendix: 1, 1-2

Licensed Test mark: TUV Rheinland of North America, Inc. c us

Signature

Dipl.-Ing. M. Glagla
QA Certification Officer

Date of Issue (day/mo/yr)
08/09/2008

TUV Rheinland of North America, Inc., 12 Commerce Road, Newtown, CT 06470, Tel (203) 426-0888 Fax (203) 426-4009

This certificate is only valid for pumps with the respective mark (Licensed Test mark) on the pump rating plate.

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Disclaimer: Our technical literature is only intended to inform our customer. The validity of general empirical values and results obtained under test conditions for specific applications depend on a number of factors beyond our control. It is therefore strictly the users' responsibility to very carefully check the validity of application to their specific requirements. No claims arising from the information provided in this literature will, consequently, be entertained.

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